MARINER NEWS

ELECTRONICS CORPORATION
DEC 26 1979

TO: Service Departments

FROM: Walter E. Kaelin, V.P. Engineering

DATE: December 13, 1979

SUBJECT: Mariner 80 Improvements

Mariner 80s with serial numbers of 2000 and up incorporate a different A4 (interface 9115 7892) and A5 (microprocessor 9115 7925) boards.

The old board set uses a dual chip 3850 microprocessor, while the new sets use a single chip 3870. The operation of the transceiver is identical, but we use an improved yellow 7 segment LED display. Please note that it is not possible to use one old and one new board.

The addendum to the service manual is included with circuit descriptions, schematics and parts lists. The A6 private channel board hook up is also shown, as one wire is different.

intech INC./282 BROKAW RD./SANTA CLARA, CA. 95050 U.S.A./(408) 244-0500/TWX 910-338-0254

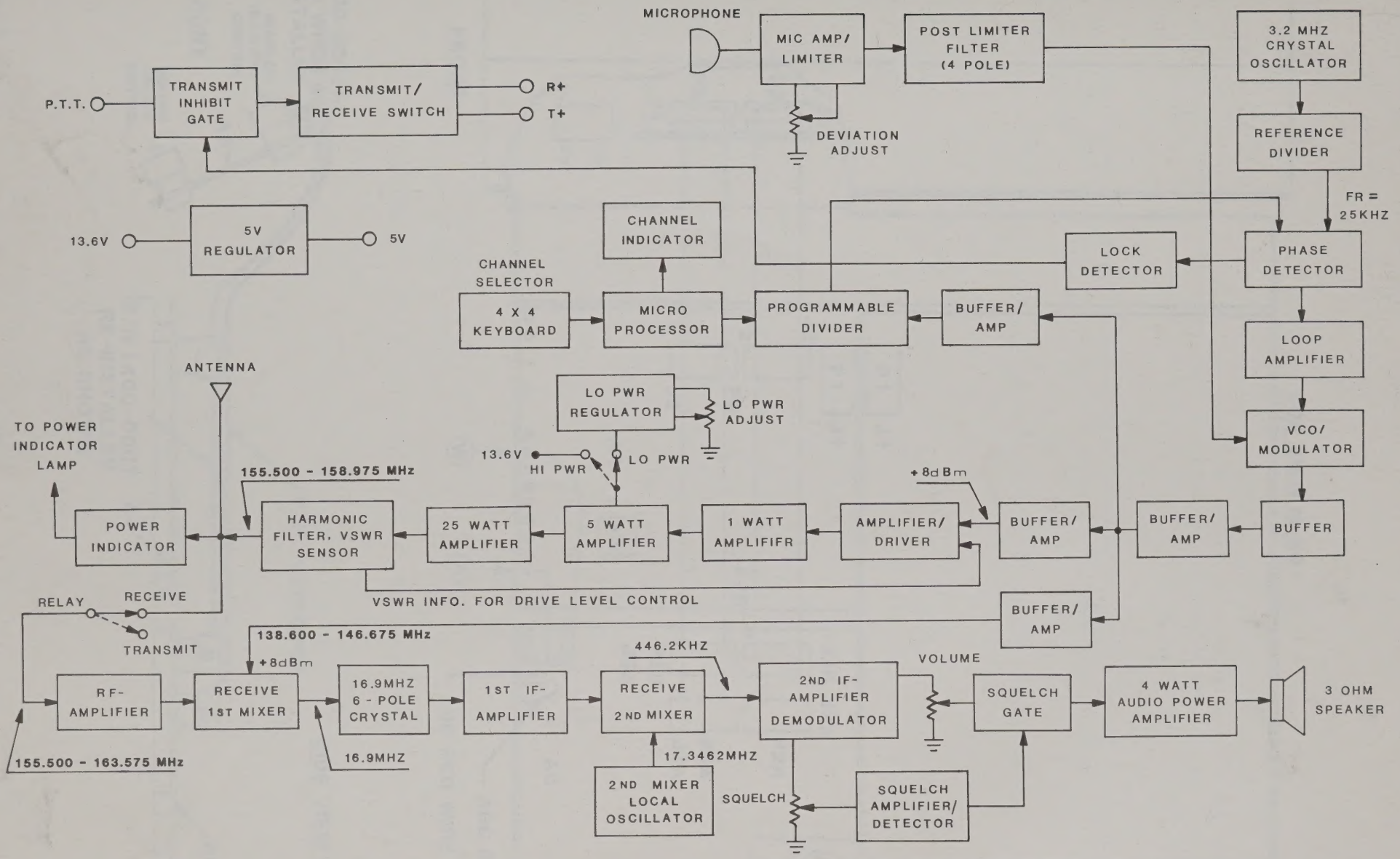
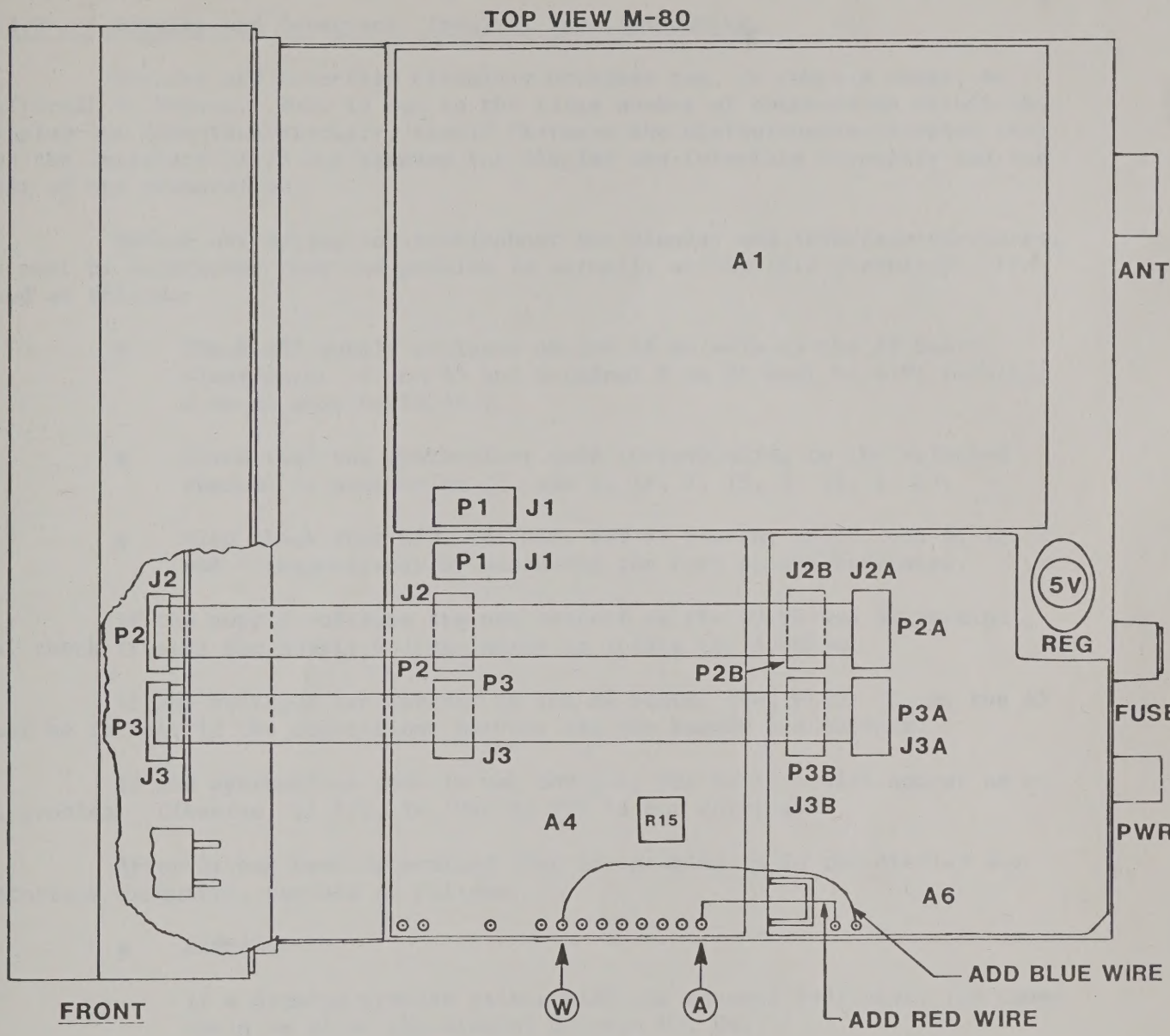
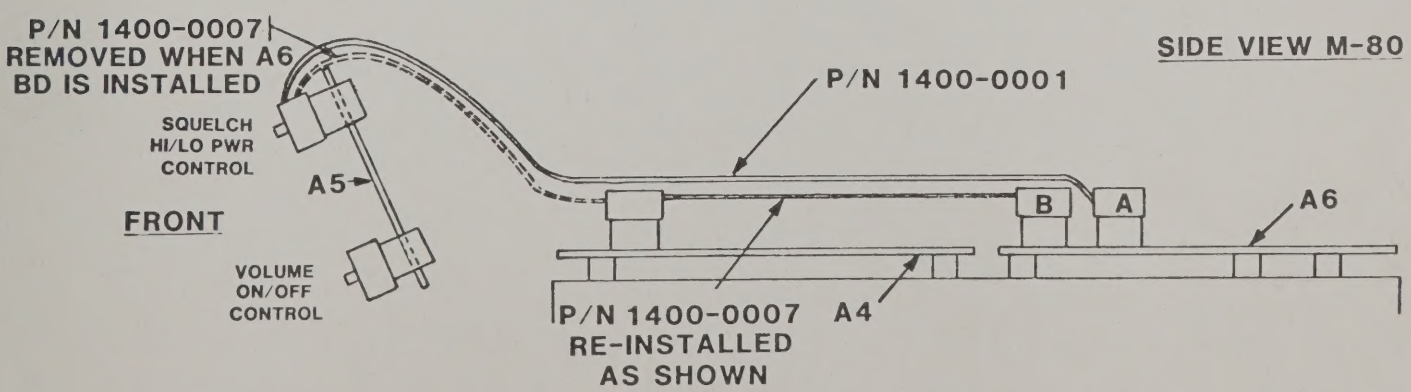


Figure 5 Mariner 80 Block Diagram


TOP VIEW M-80
A1
ANT
P1
J1
P1
J1
J2
P2
P3
J3
J2
P2
P3
J3
J2B
J2A
P2A
P2B
P3A
J3A
P3B
J3B
5V
REG
FUSE
PWR
A4
R15
A6
FRONT
W
A
ADD BLUE WIRE
ADD RED WIRE


P/N 1400-0007
REMOVED WHEN A6
BD IS INSTALLED
SQUELCH
HI/LO PWR
CONTROL
A5
FRONT
VOLUME
ON/OFF
CONTROL
SIDE VIEW M-80
P/N 1400-0001
B
A
A6
P/N 1400-0007
RE-INSTALLED
AS SHOWN
A4

4.3.5 Display and Interface Circuitry Troubleshooting.

Display and interface circuitry problems can, in certain cases, be difficult to detect. This is due to the large number of connections within the display and interface circuitry itself (between the microprocessor/display (A5) and the interface (A4)) and between the display and interface circuitry and the rest of the transceiver.

Before attempting to troubleshoot the display and interface circuitry, it must be determined that the problem is actually within this circuitry. Proceed as follows:

- Check all supply voltages on the A4 as well as the A5 board. (Test point C on A5 and terminal B on A4 must be +5V; terminal A on A4 must be 13.6V.)

- Check that the synthesizer code corresponding to the selected channel is present on J1, pin 1, 16, 2, 15, 3, 14, 4, 13.

- Also check that S/D, T+, MIC, PTT is present on J1, pin 5, 12, 9 and 7 respectively by measuring the test points indicated.

If the supply voltages are not correct on the 13.6V and 5V terminal, A4, check (trace) the supply voltage wires to locate the problem.

If the voltages are correct on the A4 board, test point C on the A5 must be correct if the connections between the two boards are correct.

If the synthesizer code is not correct, the failure will appear as an A1 problem. Likewise, if S/D, T+, MIC or PTT is not correct.

After it has been determined that the problem is in the display and interface circuitry, proceed as follows:

- DIMMING:

  If a dimming problem exists with the channel indicator, the cause could be U1 or the display drivers U3, U4.

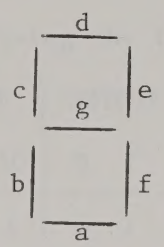
  Problems with the front panel LEDs can be caused by U2, U7 or Q2-5.

- CHANNEL INDICATOR (DISPLAY):

  Problems with the channel indicator can result from faulty 7 segment displays (U5, U6), display drivers (U3, U4) or a faulty U1 on the A5 board.

  Checking the 7 segment display can be done easily by replacement.

  Checking the display driver is done by checking the input, 4 bit, code (pin 7, 1, 2, 6) and compare with the outputs (a, b, c, d, e, f, g) in accordance to the segment identification shown below:



  If both display and driver checks out correct, the problem is in U1.

- SYNTHESIZER CODE, STATUS CODE

  Incorrect synthesizer code and/or status information will - as mentioned earlier - appear as problems on the A1 board. The problem, however, is most likely the A5 board or the interconnection between the A4 and A5 board.

  To check the interconnection, switch cables.

  To check the A5 board, make sure that test point A (A5) checks out correct. Besides checking test points, the only other test that can be performed on the A5 board is replacing U1.

  On the A4 board, U1 and U6 determine the status based upon the synthesizer code input. U1 can be checked by verifying that the correct synthesizer code is present at the input and that the particular synthesizer code results in the correct outputs (S/D, HI/LO PWR, etc.) on any channel. A partial check of U1 can be performed using the table below.

U1:

	INPUT CODE								OUTPUT CODE				CH #
pin #	19	18	17	5	4	3	2	1	14	13	8	7	
	0	1	1	0	1	1	1	0	1	1	0	0	1 (WX 1)
	1	0	0	0	1	1	0	0	0	1	1	0	16 US or INTL
	0	1	0	0	1	0	0	0	0	1	0	1	18 US or INTL

U6 can be checked using the table below.

	INPUT CODE					OUTPUT CODE				CH #
pin #	14	13	12	11	10	9	7	6	5	
	0	0	0	0	1	0	1	0	1	28 INTL
	0	0	1	0	1	0	0	1	1	16 INTL
	1	0	0	0	0	1	1	0	0	28 US
	1	0	1	0	0	1	0	1	0	16 US

- LOW POWER:

If it is not possible to adjust the low power output with R15, the problem could be Q7 or CR6-9. It is important to note, however, that the tuning of the RF power amplifier (A2) affects the performance of the low power control circuitry. See 4.3.3 for proper tuning of the RF power amplifier (A2).

If the power output remains low, regardless of the position of the HI/LO power switch (S2), a possible cause is U1 (pin 13 "stuck low"), Q4 or Q5. It is here assumed that the power amplifier (A2) checks out O.K.

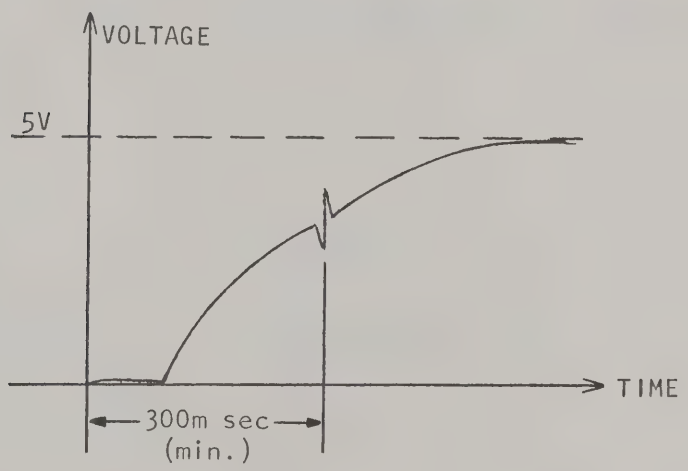
- PTT, TX INHIBIT:

  When the M-80 does not respond to keying commands, check U1, pin 14 (A4 board). A high level ("1") prevents PTT information from changing the output of U4 to turn on Q9 so that the T/R switch on A2 does not get activated. Also check U4, pin 9, 11, 2. A high ("1") level on any of these pins will also prevent keying.

  If U5F, pin 15 is low, Q10 will be turned off which also prevents keying information from reading the T/R switch on A2.

- START-UP:

  Start-up problems usually show up as wrong channel display or incorrect front panel light combinations. Turning off the unit and waiting a minute before turning it on again should clear up the problem.



For proper operation, the collector of Q11 should exhibit the response shown above.

DISPLAY AND INTERFACE CIRCUIT A4, A5

TEST POINT VALUES

A4

TEST POINT	FUNCTION	DESCRIPTION, VOLTAGE
Terminal A	Supply voltage	13.6V DC nominal
Terminal B	5V regulated supply	4.8 - 5.2V DC
U6, pin 7	S/D info to A1	Simplex = low voltage level Duplex = high voltage level
Terminal AL	Transmit B+ voltage	Receive = low voltage level Transmit = 13.6V
Terminal H	Microphone input to A1	Speech audio or tone when talking or whistling into microphone
U5B, pin 4	PTT to A1	Microphone keyed: low level Microphone not keyed: high level

A5

TEST POINT	FUNCTION	DESCRIPTION, VOLTAGE
A	Microprocessor clock oscillator	3.985513 MHz sine wave (nominal frequency)
C	5V regulated supply	4.8 - 5.2V DC

5.4 Interface, A4 (9115 7892)

PART NO.	QTY.	DESCRIPTION	REFERENCE DESIGNATOR	REMARKS MFG./SUB.
1008 0047	1	CAP., .001µF	C9	
1012 1016	2	CAP., 100µF, 16V	C2,4	
1028 0266	5	CAP., .1µF	C1,3,5-7	
1044 0302	1	CAP., 47µF, 6V	C8	
1440 0055	3	CONNECTOR, 16 PIN	J1-3	
1440 0068	2	DIP SOCKET, 20 PIN	U1,3	
2535 2750	1	RES., 75 OHM, 1/4W, 5%	R14	
2535 4102	2	RES., 1K, 1/4W, 5%	R11,27	
2535 4222	5	RES., 2.2K, 1/4W, 5%	R10,12,23,24,29	
2535 4472	1	RES., 4.7K, 1/4W, 5%	R3	
2535 5103	7	RES., 10K, 1/4W, 5%	R1,17,19-21,30,31	
2535 5223	1	RES., 22K, 1/4W, 5%	R2	
2535 6104	4	RES., 100K, 1/4W, 5%	R18,22,25,28	
2535 6474	1	RES., 470K, 1/4W, 5%	R26	
2546 3111	1	RES., 110 OHM, 3W	R13	
2702 0108	1	POT., 2K	R15	
2810 0104	6	DIODE, FH1100	CR1,3,4,9-11	
2810 0209	2	DIODE, 1N5229A	CR5,13	
2810 0232	3	DIODE, 1N4002	CR6-8	
2810 0270	5	DIODE, 1N4148	CR2,12,14-16	
2860 0171	1	I.C., MC14049BCP	U5	
2860 0175	1	I.C., MC14011BCP	U7	
2860 0233	1	I.C., SN74S471N	U1	U.S. Standard PROM
2860 0350	1	I.C., MC14514BCP	U2	
2860 0352	1	I.C., MC14078BCP	U4	
2860 0363	1	I.C., TBP18S030	U6	Programmed
2870 0100	5	TRANSISTOR, 2N2222	Q1,4,5,9,10	
2870 0104	1	TRANSISTOR, TIS97	Q11	
2870 0111	1	TRANSISTOR, 2N2907	Q12	
2870 0128	1	TRANSISTOR, 2N5193	Q6	
2870 0139	1	TRANSISTOR, 2N2219	Q7	
5071 0033	1	HEATSINK	MPQ6	

5.5 Microprocessor/Display, A5 (9115 7925)

PART NO.	QTY.	DESCRIPTION	REFERENCE DESIGNATOR	REMARKS MFG./SUB.
1006 1032	2	CAP., .001µF	C5,10	
1006 1036	1	CAP., .0033µF	C3	
1006 1043	2	CAP., .033µF	C1,2	
1006 1046	3	CAP., .1µF	C6,7,11	
1044 0300	2	CAP., 10µF, 35V	C4,12	
1044 0302	2	CAP., 47µF, 6V	C8,9	
1400 0011	2	CONNECTOR, 14 PIN	XU5,6	
1440 0055	2	CONNECTOR, 16 PIN	J2-3	
1440 0069	1	DIP SOCKET, 40 PIN	U1	
1600 1027	1	CRYSTAL, 3.985513 MHz	Y1	HC-32/U
1900 0028	2	L.E.D. DIGIT, YELLOW	U5,6	5082-7660 HP
2535 3101	1	RES., 100 OHM, 1/4W, 5%	R19	
2535 3181	1	RES., 180 OHM, 1/4W, 5%	R12	
2535 4102	8	RES., 1K, 1/4W, 5%	R10,13-18,22	
2535 5103	2	RES., 10K, 1/4W, 5%	R11,20	
2535 5123	1	RES., 12K, 1/4W, 5%	R3	
2535 5473	1	RES., 47K, 1/4W, 5%	R1	
2535 6104	1	RES., 100K, 1/4W, 5%	R21	
2850 0259	1	I.C., LF353N	U8	
2860 0165	2	I.C., SN9374N	U3,4	
2860 0174	1	I.C., MC14081BCP	U7	
2860 0359	1	I.C., MC14012BCP	U2	
2860 0362	1	I.C., MK3870	U1	
2870 0100	4	TRANSISTOR, 2N2222	Q2-5	
2870 0111	1	TRANSISTOR, 2N2907	Q1	

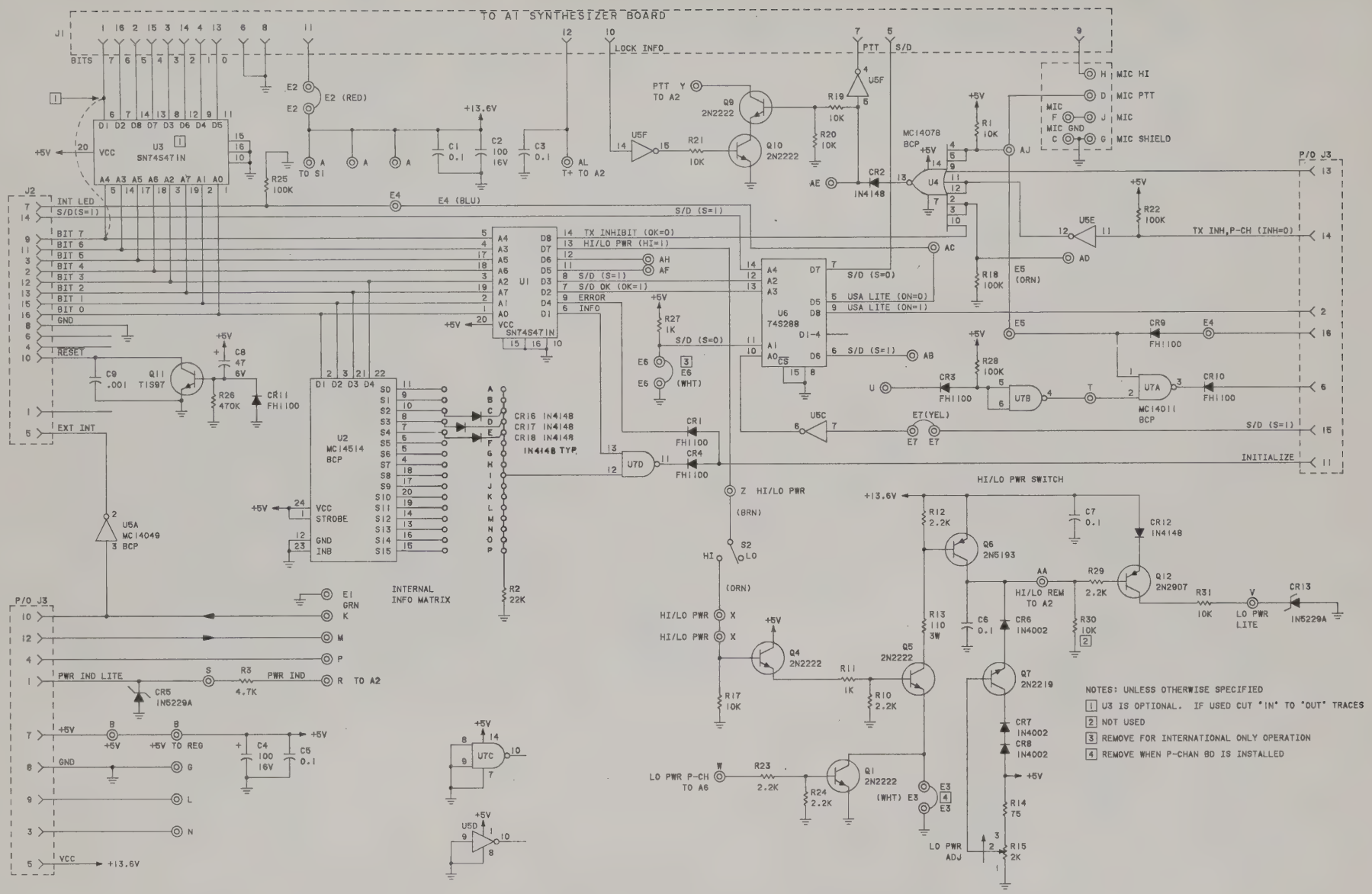


Figure 13 Interface Schematic

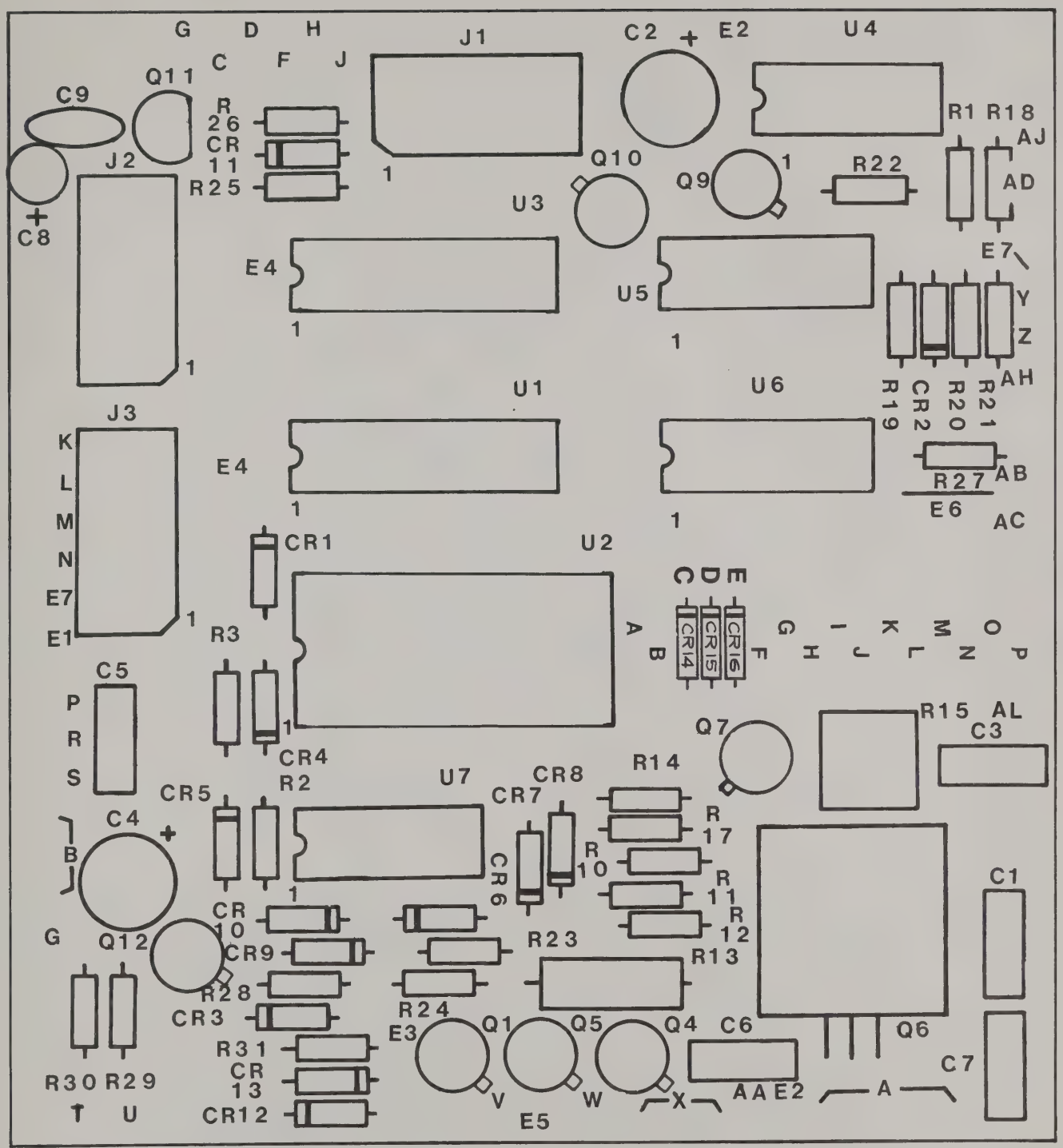


Figure 14 Interface Components Location

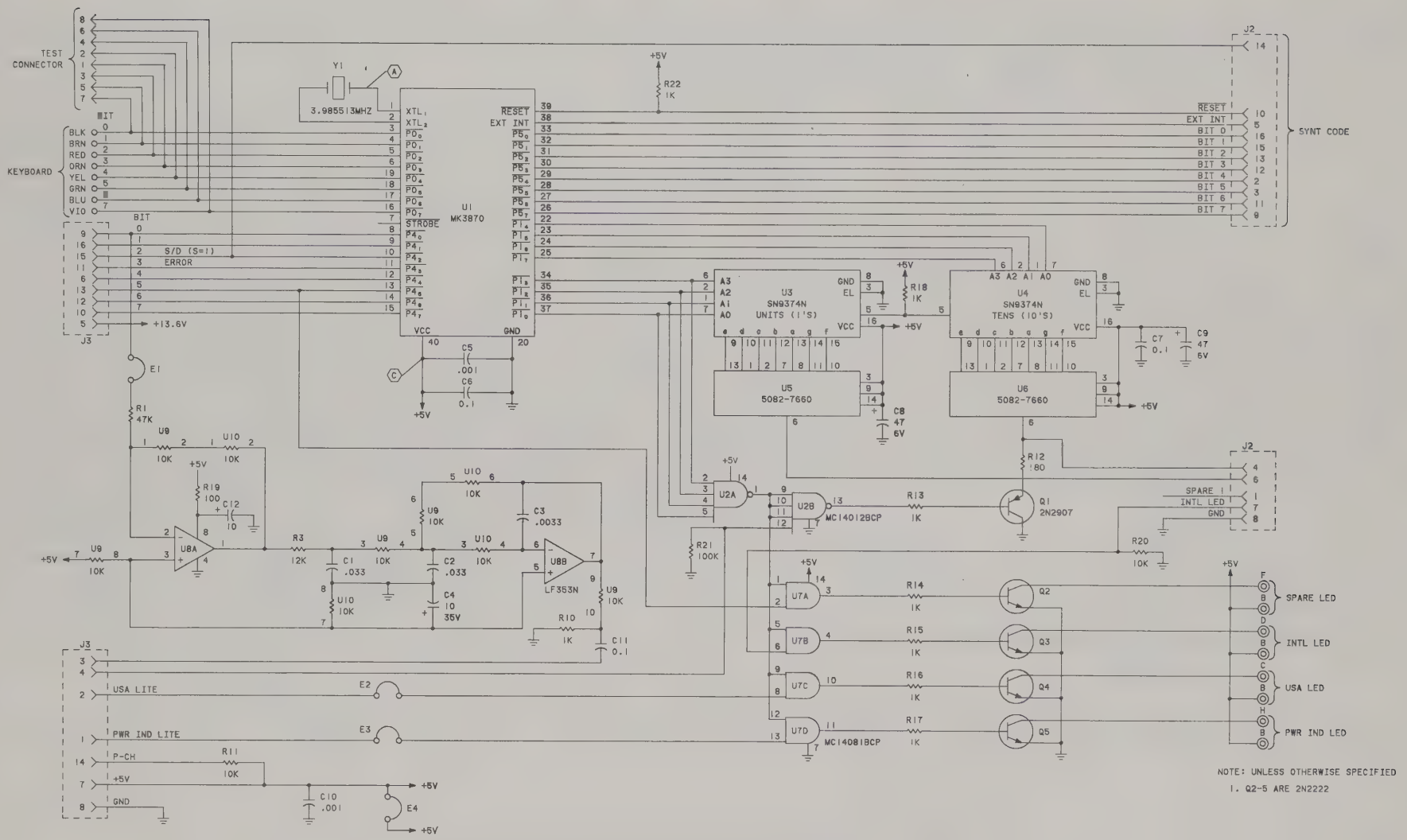


Figure 15 Microprocessor/Display Schematic

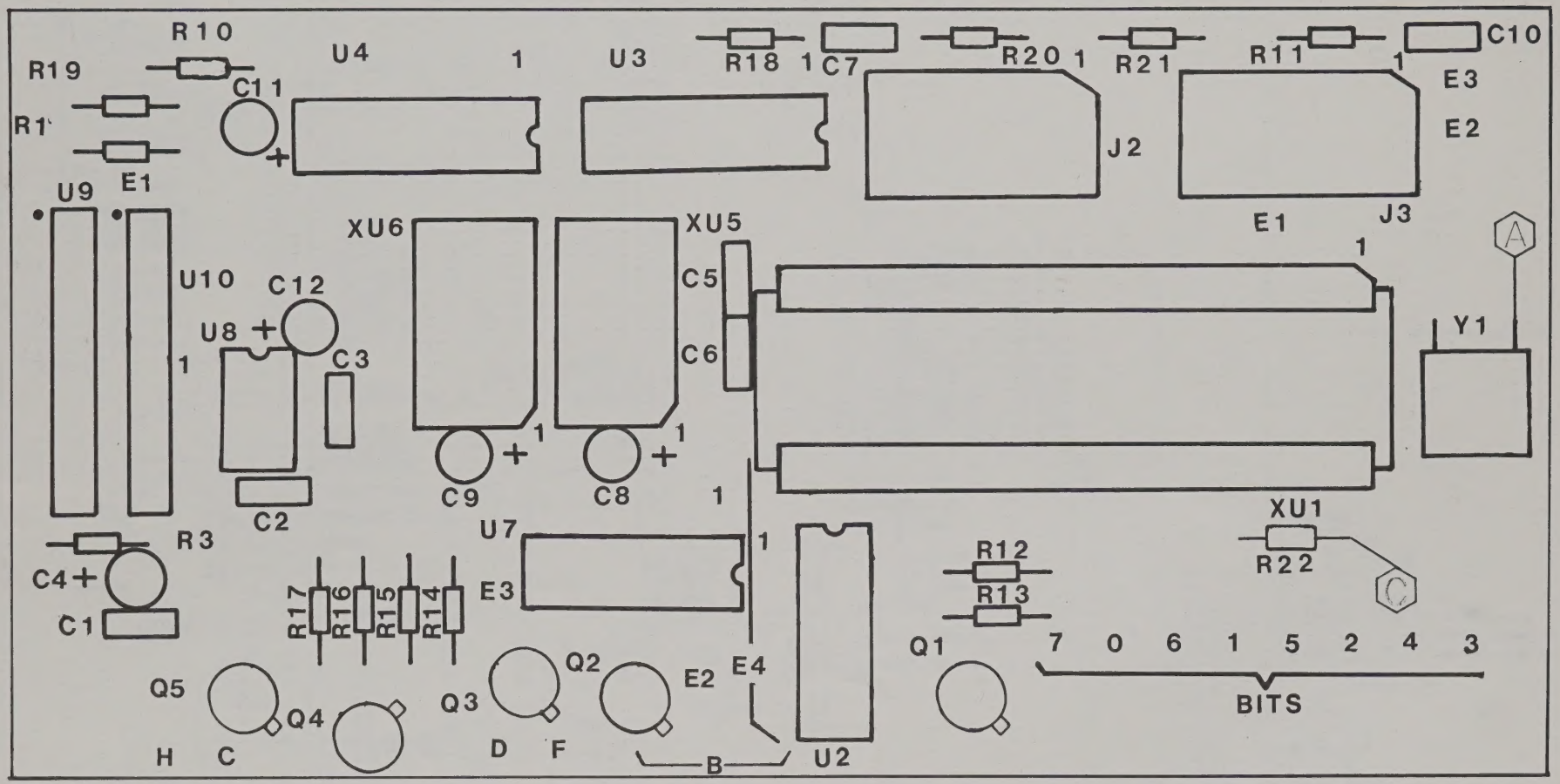
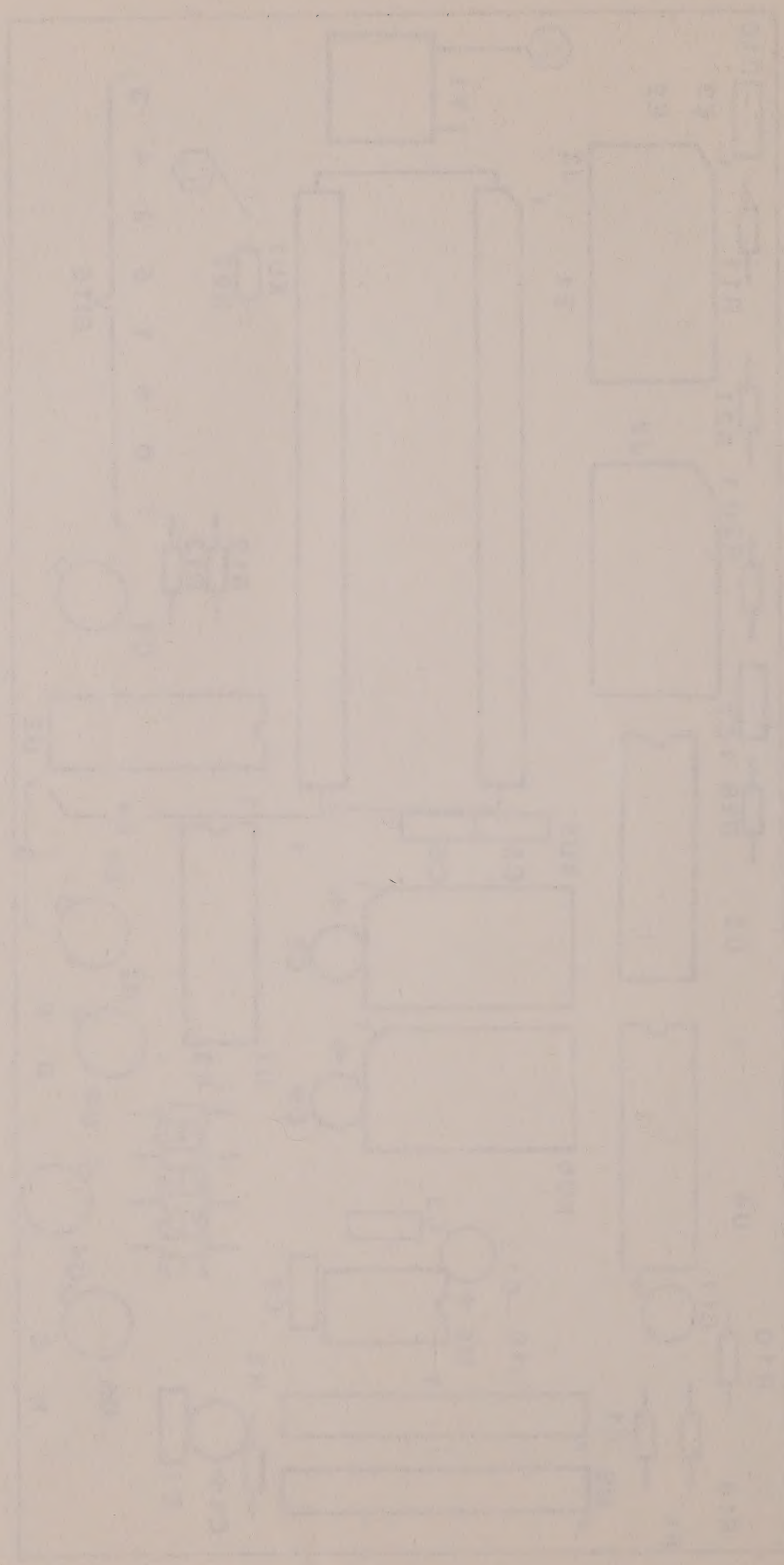


Figure 16 Microprocessor/Display Components Location



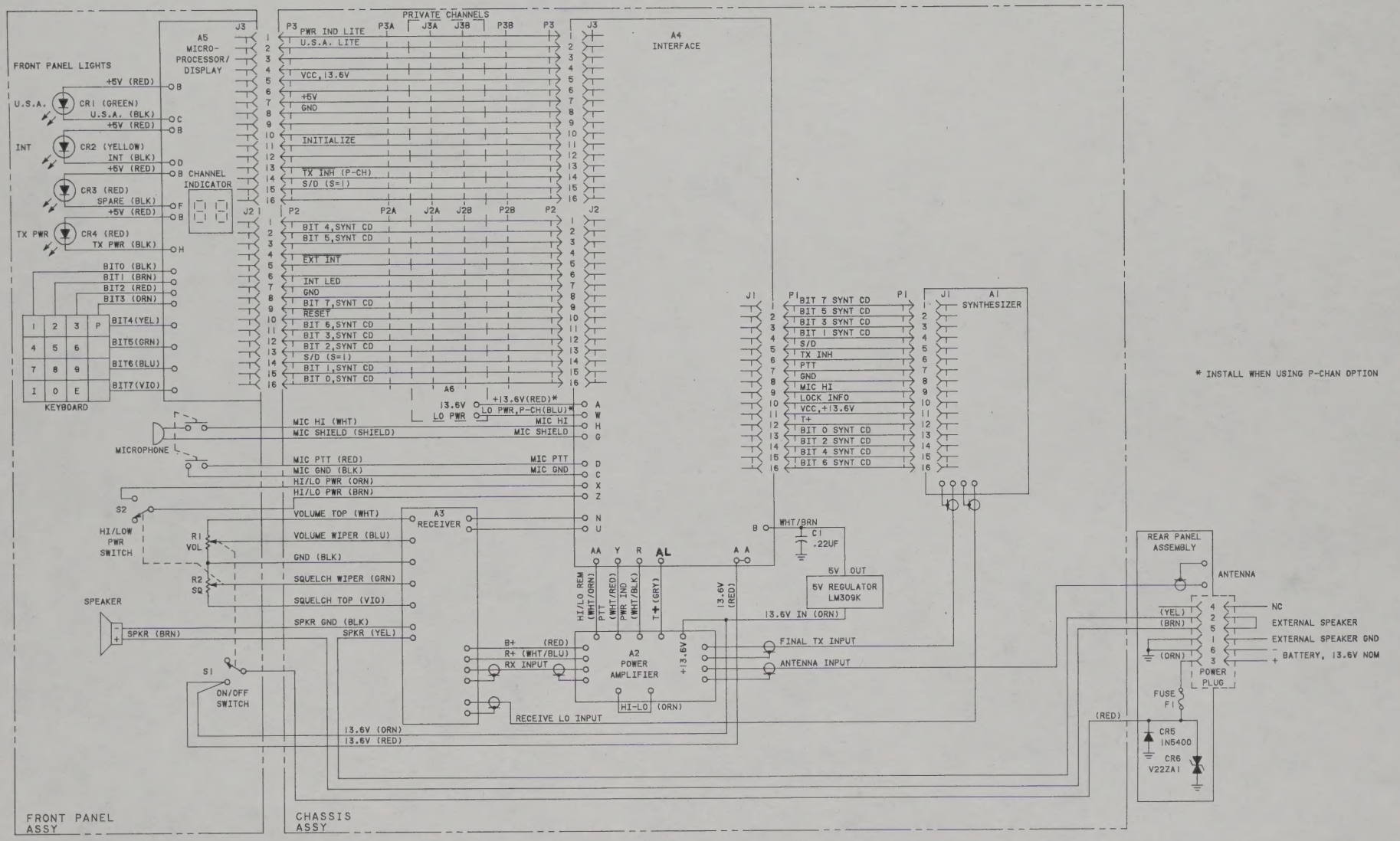


Figure 19 Interconnect Diagram